CLAIMS

1. A composition comprising

a carrier liquid;

a dispersant ; and

a chemical hydride..

2. The composition of claim 1 in which the chemical hydride has a concentration of at least 40% by weight of the composition.

3. The composition of claim 1 in which the chemical hydride has a concentration of less than 75% by weight of the composition.

4. The composition of claim 1 in which the chemical hydride has a concentration of about 61% by weight of the composition.

5. The composition of claim 1 in which the chemical hydride has a concentration of more than 90% by weight of the composition.

5. The composition of claim 1 in which the carrier liquid comprises an organic liquid.

6. The composition of claim 5 in which the organic liquid comprises mineral oil.

7. The composition of claim 6 in which the organic liquid comprises a light mineral oil.

8. The composition of claim 1 in which the carrier liquid comprises a hydrocarbon.

9. The composition of claim 8 in which the hydrocarbon comprises an alkane.

10. The composition of claim 9 in which the alkane is selected from a group consisting of pentane and hexane.

11. The composition of claim 1 in the form of a slurry.

12. The composition of claim 1 in which the carrier liquid has a viscosity in the range of about 32 Saybolt Universal seconds (S.U.s.) at standard temperature and pressure (STP) to about 100 S.U.s, preferably about 42 S.U.s. to about 59 S.U.s.

13. The composition of claim 1 in which accordance with the carrier liquid exhibits a flash point in the range of about 100 °C to about 350 °C, preferably about 154°C to about 177°C.

14. The composition of claim 1 in which the chemical hydride comprises a light metal hydride.

15. The composition of claim 1 in which the light metal hydride is selected from the group consisting of lithium hydride, lithium borohydride, lithium aluminum hydride, sodium hydride, sodium borohydride, sodium aluminum hydride, magnesium hydride, and calcium hydride.

16. The composition of claim 1 in which the dispersant comprises a triglyceride.

17. The composition of claim 16 in which the triglyceride acts as a dispersant.

18. The composition of claim 1 in which the triglyceride comprises a triglyceride of oleic acid.

19. The composition of claim 1 in which chemical hydride comprises lithium hydride.

20. The composition of claim 1 in which chemical hydride comprises magnesium hydride.

21. A method comprising the mixing of the chemical hydride with a mixture of the carrier liquid and a triglyceride after which the resulting mixture if further ground to form a stable slurry.

22. A composition comprising

a mass of chemical hydride particles in a concentration of about 90-95% by weight of the composition, and

oil coating the chemical hydride particles, the oil comprising 5-10% by weight of the composition.

23. Apparatus comprising:

a reservoir containing a chemical hydride, and

a mechanism configured to introduce a reactant to selected different portions of the chemical hydride to effect hydrogen generating reactions at different locations within the reservoir.

24. The apparatus of claim 23 in which the reservoir comprises a canister.

25. The apparatus of claim 23 in which the reservoir includes chambers that contain chemical hydride.

26. The apparatus of claim 23 in which the mechanism comprises conduits that have open delivery ends arranged to introduce the reactant to respective selected portions of the chemical hydride.

27. The apparatus of claim 23 in which the conduits are arranged in parallel.

28. The apparatus of claim 27 in which the conduits are located at different distances along an axis of the reservoir.

29. The apparatus of claim 23 in which the mechanism is configured to be movable relative to the chemical hydride contained in the reservoir.

30. The apparatus of claim 16 in which the conduits comprise needles.

31. The apparatus of claim 23 in which the mechanism includes a valving system that controls the introduction of the reactant to the different portions.

32. The apparatus of claim 23 in which the reservoir includes an exit for hydrogen generated in the reaction.

33. The apparatus of claim 23 in which the chemical hydride is dispersed in a carrier liquid at a concentration of about 40-75% by weight of the composition.

34. The apparatus of claim 23 in which the carrier liquid comprises an organic liquid.

35. The apparatus of claim 23 in which the chemical hydride comprises a light metal hydride.

36. The apparatus of claim 35 in which the light metal hydride is selected from the group consisting of lithium hydride, lithium borohydride, lithium aluminum hydride, sodium hydride, sodium borohydride, sodium aluminum hydride, magnesium hydride, and calcium hydride.

37. The apparatus of claim 33 also including a triglyceride acting as a dispersant.

38. The apparatus of claim 23 in which chemical hydride comprises lithium hydride.

39. The apparatus of claim 23 in which chemical hydride comprises magnesium hydride.

40. The apparatus of claim 23 in which the reactant comprises water.

41. A hydrogen fuel generation assembly comprising:

a reservoir for a slurry comprising a carrier liquid, a triglyceride dispersant, and a chemical hydride;

a reservoir for water;

a hydride reactor in communication with said slurry reservoir and said water reservoir and adapted to receive the slurry and water

from the reservoirs, respectively, and to mix the slurry and water to effect release of hydrogen from the slurry;

a tank for receiving the hydrogen from said reactor and for receiving hydroxide byproduct from said reactor, and for facilitating separation of the hydrogen and the hydroxide byproduct;

a heat exchanger for receiving the hydrogen from said tank and adapted to condense water from the hydrogen;

a gas-liquid separator for receiving hydrogen and water from said heat exchanger and adapted to separate the water from the hydrogen and to dispense dried hydrogen;

a conduit for conveying the water from said separator to said water reservoir; and

a conduit for conveying the dried hydrogen to a hydrogen-fueled power-producing device.

42. The assembly of claim 41 wherein said reactor comprises a tubular housing and a mixer for mixing the slurry and the water.

43. The assembly of claim 41 wherein said tank is provided with an outlet for flowing hydrogen gas from the tank, and a bottom portion for the receiving of the hydroxide byproduct.

44. The assembly of claim 41 further comprising the power-producing device.

45. The assembly of claim 44 wherein said power-producing device comprises a selected one of a fuel cell, an internal combustion engine, and an external combustion engine.

46. The assembly of claim 45 wherein said power producing device comprises a fuel cell, and further comprising conduit means for conveying condensed water from said fuel cell to said water reservoir.

47. The assembly of claim 45 wherein said power-producing device comprises a selected one of the internal combustion engine and the external combustion engine and the assembly further comprises a condenser for condensing water from water vapor from said engine, said condenser being in communication with means for conveying water from said condenser to said water reservoir.

48. A method for generating hydrogen fuel for a power-producing hydrogen-fueled device, the method comprising the steps of:

providing a slurry comprising an organic carrier liquid, a triglyceride dispersant, and a chemical hydride;

mixing said slurry with water to effect release of hydrogen from the slurry;

removing water vapor from the hydrogen released from the slurry, to provide dried hydrogen; and

conveying the dried hydrogen to the hydrogen-fueled device for the production of power.

49. The method of claim 48 wherein said organic carrier liquid comprises a light mineral oil.

50. The method of claim 48 wherein said chemical hydride comprises a selected one of lithium hydride, lithium borohydride, a combination of lithium hydride and lithium borohydride, lithium aluminum hydride, sodium hydride, sodium borohydride, sodium aluminum hydride, magnesium hydride, and calcium hydride.

51. The method of claim 48 wherein said chemical hydride comprises lithium hydride.

52. The method of claim 48 wherein said mixing of said slurry and said water is undertaken with an auger.

53. The method of claim 48 wherein said mixing of said slurry and said water is undertaken with an ultrasonic mixer.

54. The method of claim 48 comprising the further step of flowing the water removed from the hydrogen back to a source of the water for mixing with the slurry.

55. The method of claim 48 wherein the hydrogen-fueled device comprises a fuel cell, the method comprising the further step of flowing water condensed from the fuel cell back to a source of the water for mixing with the slurry.

56. A regeneration assembly for converting metal oxides and hydroxides to elemental metals, the assembly comprising:

a reactor adapted to receive the metal hydroxide and carbon, and adapted to retain a molten carbon-dissolving metal in the reactor;

means for flowing gases comprising the elemental metal in gaseous form, carbon monoxide, and hydrogen from said reactor;

a condenser adapted to receive the gases flowed from said reactor and adapted to discharge carbon monoxide and hydrogen from a first outlet and the elemental metal, metal oxide, and carbon from a second outlet;

a separator adapted to receive the elemental metal, oxide thereof, and carbon from said condenser and to discharge the elemental metal in gaseous form;

means for flowing the elemental metal and the carbon dissolving metal in liquid form from said reactor to said separator; and

means for flowing the metal oxide and the carbon dissolving metal from said separator to said reactor.

57. The assembly of claim 56 further comprising a second separator for receiving the carbon monoxide and hydrogen from said condenser, said second separator having a first outlet for discharging carbon monoxide and a second outlet for discharging hydrogen.

58. A method for converting metal oxides and metal hydroxides to elemental metals thereof, the method comprising the steps of:

admitting the metal hydroxide and carbon into a reactor having molten carbon-dissolving metal therein;

flowing gases comprising the elemental metal in gaseous form, carbon monoxide and hydrogen from the reactor to a condenser;

condensing out the elemental metal and oxide thereof, and carbon, and flowing same to a separator;

flowing carbon monoxide and hydrogen from the condenser;

flowing the elemental metal and the carbon dissolving metal from the reactor to the separator;

flowing elemental metal oxide and the carbon dissolving metal from the separator to the reactor; and

flowing the elemental metal from the separator.

59. The method of claim 58 including the further step of flowing an inert gas into the reactor.

60. A composition comprising

a carrier liquid;

a triglyceride; and

a chemical hydride dispersed in the carrier liquid at a concentration of about 40-75% by weight of the composition.

61. The composition of claim 1 in which the triglyceride comprises triolein.

62 The apparatus of claim 23 in which the chemical hydride is dispersed in a carrier liquid at a concentration about 90-95% by weight of the composition.